PATENT COOPERATION TREATY

From the
INTERNATIONAL SEARCHING AUTHORITY

To:

see form PCT/ISA/220

PCT

WRITTEN OPINION OF THE INTERNATIONAL SEARCHING AUTHORITY
(PCT Rule 43*bis*.1)

Date of mailing *(day/month/year)* see form PCT/ISA/210 (second sheet)	
Applicant's or agent's file reference see form PCT/ISA/220	**FOR FURTHER ACTION** See paragraph 2 below

International application No.	International filing date *(day/month/year)*	Priority date *(day/month/year)*
PCT/GB2005/000819	02.03.2005	03.03.2004

International Patent Classification (IPC) or both national classification and IPC
H01L51/20

Applicant
CAMBRIDGE DISPLAY TECHNOLOGY LIMITED

1. This opinion contains indications relating to the following items:

- ☒ Box No. I Basis of the opinion
- ☐ Box No. II Priority
- ☐ Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability
- ☐ Box No. IV Lack of unity of invention
- ☒ Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement
- ☐ Box No. VI Certain documents cited
- ☒ Box No. VII Certain defects in the international application
- ☐ Box No. VIII Certain observations on the international application

2. **FURTHER ACTION**

If a demand for international preliminary examination is made, this opinion will usually be considered to be a written opinion of the International Preliminary Examining Authority ("IPEA"). However, this does not apply where the applicant chooses an Authority other than this one to be the IPEA and the chosen IPEA has notifed the International Bureau under Rule 66.1*bis*(b) that written opinions of this International Searching Authority will not be so considered.

If this opinion is, as provided above, considered to be a written opinion of the IPEA, the applicant is invited to submit to the IPEA a written reply together, where appropriate, with amendments, before the expiration of three months from the date of mailing of Form PCT/ISA/220 or before the expiration of 22 months from the priority date, whichever expires later.

For further options, see Form PCT/ISA/220.

3. For further details, see notes to Form PCT/ISA/220.

Name and mailing address of the ISA:

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Box No. I Basis of the opinion

1. With regard to the **language**, this opinion has been established on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.

   ☐ This opinion has been established on the basis of a translation from the original language into the following language , which is the language of a translation furnished for the purposes of international search (under Rules 12.3 and 23.1(b)).

2. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application and necessary to the claimed invention, this opinion has been established on the basis of:

   a. type of material:

   ☐ a sequence listing

   ☐ table(s) related to the sequence listing

   b. format of material:

   ☐ in written format

   ☐ in computer readable form

   c. time of filing/furnishing:

   ☐ contained in the international application as filed.

   ☐ filed together with the international application in computer readable form.

   ☐ furnished subsequently to this Authority for the purposes of search.

3. ☐ In addition, in the case that more than one version or copy of a sequence listing and/or table relating thereto has been filed or furnished, the required statements that the information in the subsequent or additional copies is identical to that in the application as filed or does not go beyond the application as filed, as appropriate, were furnished.

4. Additional comments:

Box No. V Reasoned statement under Rule 43*bis*.1(a)(i) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes:	Claims	3,5-9,11,13,18
	No:	Claims	1,2,4,10,12,14-17
Inventive step (IS)	Yes:	Claims	
	No:	Claims	1-18
Industrial applicability (IA)	Yes:	Claims	1-18
	No:	Claims	

2. Citations and explanations

see separate sheet

Box No. VII Certain defects in the international application

The following defects in the form or contents of the international application have been noted:

see separate sheet

Re Item V.

1. Reference is made to the following document:
   D1a : PATENT ABSTRACTS OF JAPAN, vol. 1998, no. 11, 30 September 1998
   D1b: JP 10 172756 A (IDEMITSU KOSAN CO LTD), 26 June 1998 (1998-06-26)
   D2a: PATENT ABSTRACTS OF JAPAN vol. 2003, no. 12, 5 December 2003
   D2b: JP 2004 039500 A (SEIKO EPSON CORP), 5 February 2004 (2004-02-05)

2.
The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claims 1, 2, 4, 10, 12, 14, 15-17 is not new in the sense of Article 33(2) PCT.
Document D1b discloses (the references in parentheses applying to this document):
An OLED device (figure 1) having at least one pixel, comprising:
a planar light coupling layer (figure 1, layer 3) having a front surface and a back surface, said layer having a thickness *T;*
a light emitting portion for each pixel (figure 1), disposed on the back surface of the light coupling layer; and
a microlens for each pixel (figure 1), having a radius of curvature *R,* disposed on the front surface of the light coupling layer such that its centre of curvature is within the light coupling layer,
wherein the radius of curvature *R* and the thickness T are such that $R - xT$, where x has a value in the range from 0.2 to 0.8 (abstract: T=focal distance of the planoconvex microlens,f, a known formula in optic for a planoconvex lens is R=(n-1)f, n being the refractive index of the lens, in document D1 T=f then R=(n-1)T, in paragraph 21 of D1, n is between 1,6-1,9).
All features of claim 1 are therefore disclosed in D1b, consequently the subject-matter of this independent claim is not new in the sense of Article 33(2) PCT.

Additional features of claims 2 (figure 1), 4 (abstract), 10 (abstract), 12 (layer 3 of figure 1 is glass, paragraph 37, D1, and ordinary glass has a refractive index of 0.5), 14 (glass material for layer 3), 15, 16 (pixel has a pixel pitch,P,100µm, paragraph 39, diameter of each lens is 100µm, paragraph 37, each lens extend across the full width of each pixel pitch, then $D=R\sqrt{(1-1/(2y^2))}$, and by calculation with T=220µm (paragraph 37), D=zT, z between 0.2-0.8), 17 (P=100µm, T=220µm) are also disclosed in D1b (Article 33(2) PCT).

3.

Dependent claims 3, 5-9, 11, 13, 18 do not contain any features which, in combination with the features of any claim to which they refer, meet the requirements of the PCT in respect of inventive step (Article 33(3) PCT), as the skilled person would have combined the teachings of D1b with those of D2b to arrive at the use of microlenses having a refractive index of 1.54 (see D2b, paragraphs 16, 31), thereby having a relation R=0,54T (claims 5-9, 13), at a top emitting device wherein T of encapsulation layer (D2b, figure 1, layer 16) (distance between top transparent electrode and lens) and R, radius of curvature of each lens satisfy the relation R=xT (x between 0.2 and 0.8) (claim 3) and at the use of Fresnel lens (D2b, paragraph 19). The dimension of the pixel pitch and the thickness of the planar light coupling layer mentioned in claim 18 would have also been contemplated by the skilled person.

Re Item VII

On page 5 of the description, a formula $D^2+P^2/2=R^2$ is mentioned and on page 6, it is mentioned that when D=0, P=2R, however from the formula you get $P=\sqrt{2}$ R. It appears therefore that an error has been made. When considering that each lens extend across the full width of each pixel (page 5, last paragraph) it appears that the formula should rather be $D^2+(P/2)^2=R^2$.